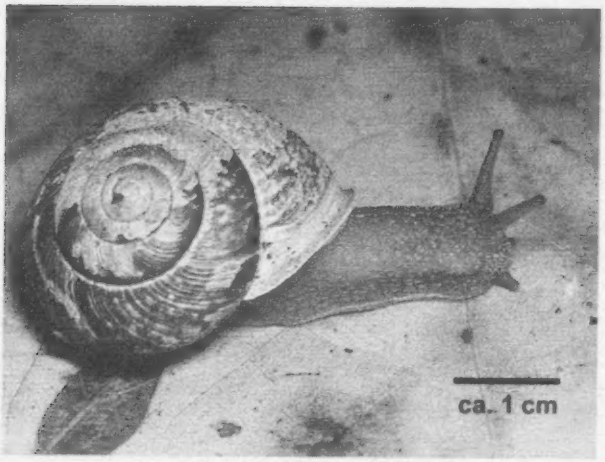
COSEWIC
Assessment and Status Report

on the

Oregon Forestsnail
Allogona townsendiana

in Canada



ENDANGERED
2002

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

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COSEWIC
Assessment Summary

Assessment Summary – November 2002

Common name
Oregon Forestsnail

Scientific name
Allogona townsendiana

Status
Endangered

Reason for designation
The species is restricted to a very small area of the extreme southwestern British Columbia mainland and southern Vancouver Island. Populations are severely fragmented with continuing declines observed in extent of occurrence, area of occupancy and area, extent and quality of habitat due mainly to urban development. Even though there may be other locations, the species is still very uncommon.

Occurrence
British Columbia

Status history
Designated Endangered in November 2002. Assessment based on a new status report.

COSEWIC
Executive Summary

Oregon Forestsnail
Allogona townsendiana

Species information

The Oregon Forestsnail **("Escargot-forestier de Townsend")**, *Allogona townsendiana* (I. Lea, 1838), is a member of the family Polygyridae, a large and diverse group of land snails endemic to North America. The shell of mature individuals attains a diameter of 28–35 mm and is pale brown or straw-yellow and globose in form. The apertural lip of the shell is pale and broadly expanded, but unlike some other related species it lacks a tooth-like structure (parietal denticle) within. The outer layer of the shell is smooth, without fine hair-like projections as in related groups.

Distribution

The Oregon Forestsnail occurs in the western Cascade Range, Puget Trough, and eastern lowlands of the Olympic Peninsula in the United States north into extreme southwestern British Columbia. In British Columbia most records are from the Fraser Valley in the Mission/Abbotsford/Chilliwack area and from the lower portion of the Chilliwack Valley. There are two outlying localities, in Langley and on southern Vancouver Island.

Habitat

The Oregon Forestsnail occupies mixed-wood and deciduous forests, typically dominated by Bigleaf Maple (*Acer macrophyllum*). Dense cover of low herbaceous vegetation is usually present. Almost all known Canadian localities are below 360 m in elevation.

Biology

Little is known of the ecology and life history of the Oregon Forestsnail. The snails are hermaphroditic, lay eggs, and may be slow-maturing and long-lived. Their dispersal ability is probably poor, based on the scattered distribution pattern of the species throughout its geographic range. The surface activity of the snails appears to peak in spring and early summer, coinciding with mating and oviposition.

Population sizes and trends

Increased search effort since the 1950s has resulted in several additional localities for the Oregon Forestsnail. There is no information available on population size from previously known sites to allow the assessment of trends.

Limiting factors and threats

Historically, climatic factors and availability of suitable low-elevation mixed-wood forest habitats have probably limited the northward expansion of the species' distribution in Canada. Probably most important to the survival of the Oregon Forestsnail at present is: 1) that the species has a limited, patchy distribution; and 2) that it lives in and adjacent to some of the most heavily modified and utilized land in British Columbia. Land conversions, especially urban developments, are expected to continue, leading to habitat degradation and loss.

Special significance of the species

Relatively few native, large land snails inhabit west coast forests in British Columbia, and where the Oregon Forestsnail occurs, it contributes significantly to the biodiversity of the forest floor fauna. The presence of the Oregon Forestsnail in Canada is of both scientific and conservation interest, as populations at the northern limits of their geographical range might possess unique adaptations.

Existing protection or other status designations

Assessments of terrestrial gastropods for the provincial red and blue lists of species at risk are yet to be conducted, and the British Columbia Wildlife Act does not legally protect terrestrial gastropods. Only one of the known localities of the Oregon Forestsnail lies within a protected area. In the United States there is no special status for this species, and it is not considered to be at risk from forest-harvesting activities.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.
** Formerly described as "Not In Any Category", or "No Designation Required."
*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list.

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Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

COSEWIC Status Report

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Oregon Forestsnail

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in Canada

2002

TABLE OF CONTENTS

SPECIES INFORMATION 3
Name and classification 3
Description 3
DISTRIBUTION 5
Global range 5
Canadian range 5
HABITAT 9
Habitat requirements 9
Trends 9
Protection/ownership 10
BIOLOGY 10
General 10
Reproduction 11
Survival 11
Movements/dispersal 11
Nutrition and interspecific interactions 12
Behaviour/adaptability 12
POPULATION SIZES AND TRENDS 12
LIMITING FACTORS AND THREATS 13
SPECIAL SIGNIFICANCE OF THE SPECIES 14
EXISTING PROTECTION OR OTHER STATUS 14
SUMMARY OF STATUS REPORT 15
TECHNICAL SUMMARY 16
ACKNOWLEDGEMENTS 17
LITERATURE CITED 17
BIOGRAPHICAL SUMMARIES OF CONTRACTORS 19
AUTHORITIES CONSULTED 19
COLLECTIONS EXAMINED 20

List of figures

Figure 1. Shell of *Allogona townsendiana*. 4
Figure 2. Living animal of *Allogona townsendiana* 4
Figure 3. World distribution of the *Allogona townsendiana*, based on Pilsbry 6
Figure 4. Canadian distribution of *Allogona townsendian* 7

SPECIES INFORMATION

Name and classification

The Oregon Forestsnail, *Allogona (Dysmedoma) townsendiana* (I. Lea, 1838), originally described by Isaac Lea as *Helix townsendiana*, was later recognized as a member of the Polygyridae (Mollusca: Gastropoda: Pulmonata). The family Polygyridae is a large and diverse group of land snails endemic to North America (Pilsbry 1940; Emberton 1994, 1995). The suprageneric classification of the family (see below) has undergone exhaustive revision by Emberton (1995), but this revision does not affect the validity of the species. The species has been treated as a member of the genus *Allogona* since Pilsbry (1936). No subspecies of *A. townsendiana* are recognized.

The current classification of the species is as follows: Phylum Mollusca: Class Gastropoda: Subclass Pulmonata: Order Stylommatophora: Suborder Sigmurethra; Superfamily Polygyroidea: Family Polygyridae: Subfamily Polygyrinae: Tribe Allogonini: Genus *Allogona*: Subgenus *Dysmedoma*: Species *Allogona townsendiana.*

The genus *Allogona* is currently believed to contain four species: the Selway Forestsnail (*A. lombardii* A. G. Smith, 1943), the Broad-banded Forestsnail (*A. profunda* [Say, 1821]), the Idaho Forestsnail (A. ptychophora [A.D. Brown, 1870]), and *A. townsendiana* (Pilsbry 1940; Turgeon et al. 1998). All three western species — *A. lombardii, A. ptychophora* and *A. townsendiana* — belong to the anatomically distinct subgenus *Dysmedoma*. Additionally, Pilsbry (1940) lists several nominal subspecies, and at least one of these, *A. ptychophora solida* (Vanatta, 1924), is speculated to be a full species (Frest & Johannes 1995). In Canada the genus *Allogona* is represented by two species, *A. townsendiana* and *A. ptychophora*. Some British Columbia shells attributed to *A. lombardii* by Smith (1943) and thought doubtful by La Rocque (1953) are likely to be *A. ptychophora* (Forsyth 1999a).

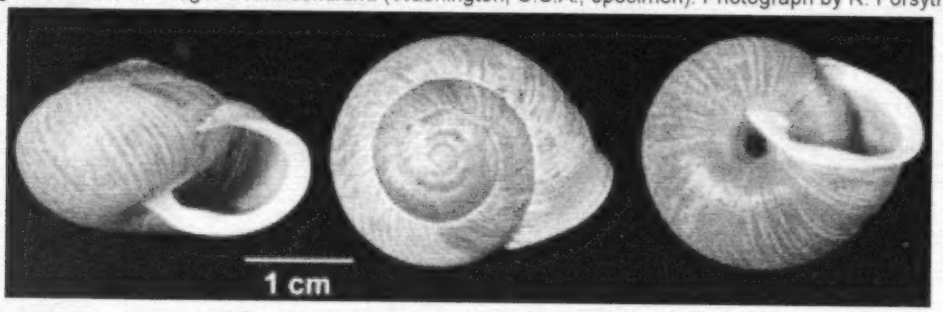
The nominal subspecies *A. townsendiana brunnea* Vanatta, 1924, originally described from near Kelso, Cowlitz County, Washington, and based on a colour morph, is regarded a synonym (Branson 1977). *Allogona townsendiana frustrationis* Pilsbry, 1940, named from Cape Disappointment, Pacific County, Washington, also appears to be a synonym (Forsyth in preparation). Other than these taxa, there are no recent synonyms, and Pilsbry (1940) lists the complete synonymy known to him for the species.

Description

Pilsbry (1940) and Kozloff (1976) described and provided illustrations of *A. townsendiana*. The adult shell is large (width, 28–35 mm), globose, and pale brown or straw-yellow (Figures 1 and 2). There are 5¼–6 whorls that bear irregular, light-coloured, wrinkle-like axial riblets and exceedingly fine, wavy spiral striae. Irregular dimpled sculpture is usually present. The fine spiral striae are often not evident on eroded shells that lack the outer, periostracal layer. The periostracum does not have

fine hair-like structures present in some polygyrid snails. The apertural lip is white, thickened, and strongly flared outward. Basally the lip is heavier with a slight bulging callus at its junction with the columellar lip, but there is no denticle within the aperture.

Figure 1. Shell of *Allogona townsendiana* (Washington, U.S.A., specimen). Photograph by R. Forsyth.



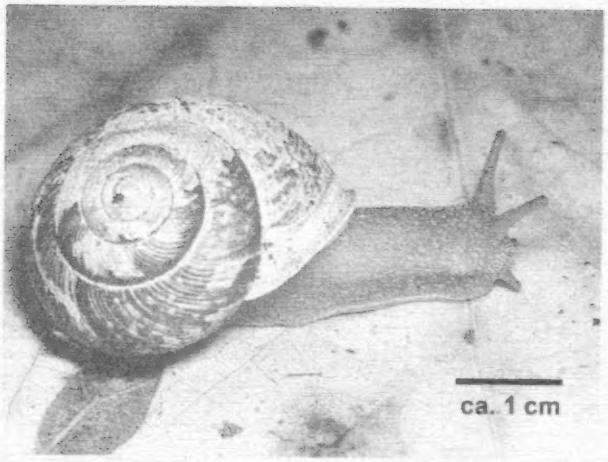


Figure 2. Living animal of *Allogona townsendiana* (British Columbia). Photograph by K. Ovaska.

There has been little confusion in literature or museum records of *A. townsendiana* with other species. It is one of the largest land snails in southwestern British Columbia, not likely to be misidentified with any other sympatric species. The Pacific Sideband (*Monadenia fidelis*), for example, is a large, brightly coloured, banded species quite unlike *A. townsendiana*. The most likely confusion is with other polygyrid snails, all of which have the distinctly flared or recurved apertural lip. The Idaho Forestsnail (*A. ptychophora*) is very similar but the shell is slightly smaller, rarely malleated, and has more clearly developed axial riblets. In Canada, the ranges of the two species are allopatric; *A. ptychophora* occurs in southeastern British Columbia and southern Alberta (Pilsbry 1940; Branson 1977; Forsyth 1999a). The Puget Oregonian (*Cryptomastix devia*) and Pygmy Oregonian (*C. germana*) are recognized by the presence of a denticle within the aperture of adult shells. Both the Northwest Hesperian (*Vespericola*

columbianus) and *C. germana* are much smaller (<16 mm and <7 mm, respectively) and have a hairy periostracum.

The genital anatomy of many terrestrial molluscs is often more distinctive than the shell. However, the anatomy of *A. townsendiana* has not been critically compared with that of other species in the subgenus *Dysmedoma*.

DISTRIBUTION

Global range

The range of *A. townsendiana* is given by Pilsbry (1940) to extend from the Chilliwack River valley, British Columbia, south through Washington State in the Puget Trough and Willamette Valley to as far as Corvallis, western Oregon; it also extends east up the Columbia River (Figure 3). In northwest Washington, the occurrence of this species is patchy (T. Burke, pers. comm.). Branson (1977) found it at several peripheral sites along the eastern side of the Olympic Peninsula and considered it a recent invader there.

Canadian range

The range of *A. townsendiana* in Canada has never been adequately described. Based on literature (Whiteaves 1902, 1906; Dall 1905; Pilsbry 1940; La Rocque 1953; Cameron 1986), museum records, and unpublished data (Figure 4), *A. townsendiana* occurs in portions of the Lower Fraser and Chilliwack valleys in southwestern British Columbia. There is also one old record from southern Vancouver Island (Figure 4). The total number of reasonably located sites (disregarding records clearly repeated verbatim from earlier sources) is 19.

Dall (1905) listed the species from Chilliwack Lake, but this seems unlikely. Forest type and other conditions probably prevent its occurrence around the vicinity of the lake and much of the upper portion of the Chilliwack Valley (Ovaska et al. 2001a).

A number of records of *A. townsendiana* exist in the Canadian Museum of Nature (CMN). Most of these specimens were collected in the Chilliwack and Fraser valleys during fieldwork in 1959 by Robert J. Drake while under contract to the National Museum of Canada (now CMN, in part) (Drake 1963). The CMN also holds the specimen cited by Whiteaves (1902), two 1954 Abbotsford records and one from Vancouver Island. The Vancouver Island locality, northwest of Westholme near Crofton is the only known occurrence on Vancouver Island; it was collected in 1903. More recently, Cameron (1986; pers. comm.) found two empty, broken, yet fresh shells at each of two sites near Popkum, east of Chilliwack, on the south side of the Fraser River.

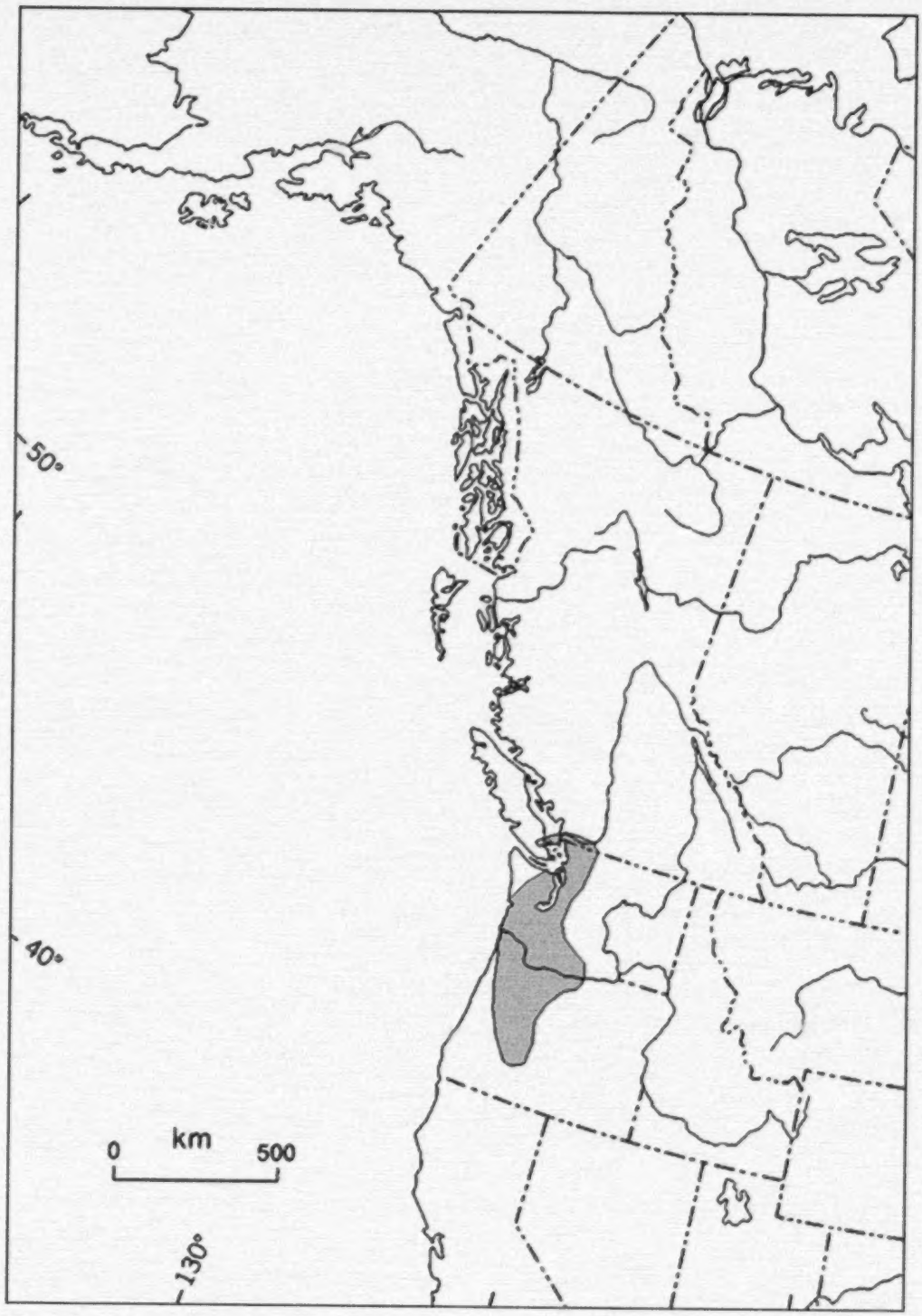


Figure 3. World distribution of the *Allogona townsendiana*, based on Pilsbry (1940:882, figure 508) and Canadian records.

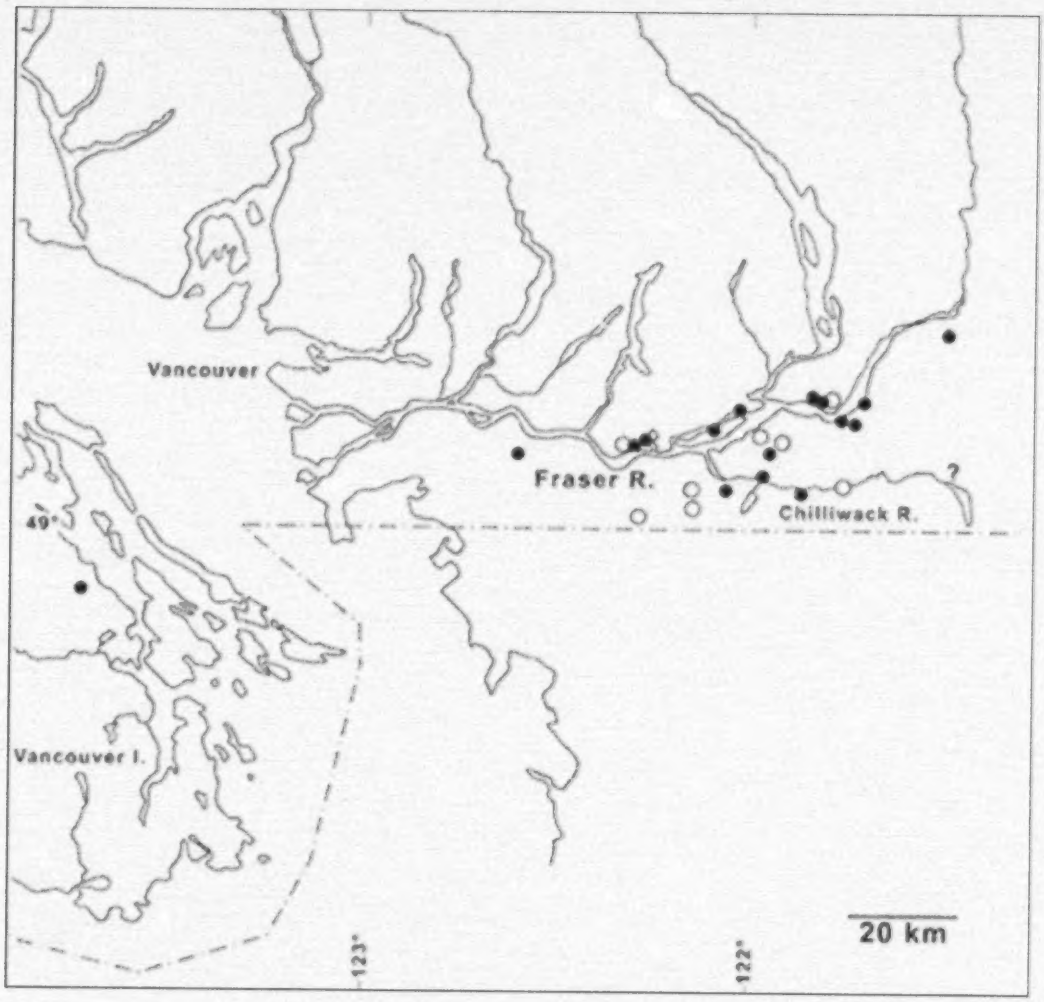


Figure 4. Canadian distribution of *Allogona townsendiana*. Broken line: Canada-United States border. Solid symbols – exact localities known; open circles – approximate localities (historical records with exact localities unknown).

In 2000 and 2001, Ovaska et al (2001 a, b) located *A. townsendiana* at 12 of 38 sites surveyed on the lower mainland of British Columbia; the species was not found at the 104 localities surveyed on Vancouver Island. In 2000 they revisited and located the species at both sites where Cameron (1986) had found it 15 years previously. The total search time for all 38 sites was 56.7 person-hours. Voucher material was deposited in the Royal British Columbia Museum (RBCM).

Pilsbry (1940) mentions that *A. townsendiana* occurs in Blaine, Washington, and there is also a record from Point Roberts, Washington (G. Holm, pers. comm.); both localities are very close to the British Columbia–Washington border at the Vancouver suburbs of Surrey and Delta. There is no historical evidence that the species ever

occurred this far west on mainland British Columbia, and it is unknown if its absence there is because of happenstance or extirpation due to habitat alteration and development.

The Field Museum of Natural History holds one record, from Agassiz.

Allogona townsendiana is most likely to be confused with the Idaho Forestsnail (*A. ptychophora*). In the Field Museum of Natural History the single record of *Allogona* from British Columbia is labelled as *A. ptychophora* although its locale is within the distribution of *A. townsendiana*. Conversely, the Canadian Museum of Nature had several records for *Allogona* from southwestern British Columbia labeled as *A. ptychophora* that were re-identified by R. Forsyth in October 2001 as *A. townsendiana*. Most identifications of *A. townsendiana* in the literature are correct based on distributional information, and only the Mission Junction locality cited by Whiteaves (1906) appears to have been confused with *A. ptychophora*; we were unable to determine if this specimen still exists.

Additional, unreported populations may well exist on the lower mainland of British Columbia. Potential sites for further investigation include lowland mixed-wood forests on the north side of the Fraser River, east of Agassiz and west of Mission, and south of the Fraser River, from the Strait of Georgia (Surrey) east to the known sites in the Chilliwack-Abbotsford area. The Langley sub-population, west of the main occurrence (Ovaska et al. 2001b), suggests that additional populations may exist in these areas. There are no recent records from Vancouver Island, but the area north of Victoria on southeastern part of the island has suitable habitat that may support the species.

Based on historical and recent records, the extent of occurrence of *A. townsendiana* in Canada is about 1205 km^2; this area excludes the single Vancouver Island record and uses the Canada-United States border as one of its delineators; several of the critical localities are poorly defined and not exactly known.

The area of occupancy is difficult to determine for two reasons: the species shows a patchy distribution; it does not use all suitable habitats; and its extent of occupancy at most localities is yet to be determined. In the few instances where we have some information on the actual area occupied by particular demes, the area is surprisingly small. For example, the Warton Creek locality is less than 0.08 km^2; Cemetery Hill is 1.18 km^2; Hopyard Hill is 1.64 km^2; Tamihi Creek is less than 0.001 km^2; and on Nicomen Island the species possibly occupies a strip less than 20 m wide. Heavily utilized agricultural land forms a gap $\geq$ 400 m between suitable habitat on Hopyard and Cemetery Hills and probably acts as a barrier for movements.

Notwithstanding the ineffective colonization of all suitable habitats throughout its range, the area of occupancy of *Allogona townsendiana* in Canada is probably less than 20 km^2.

HABITAT

Habitat requirements

Habitat requirements of *A. townsendiana* are poorly known. It occupies mixed-wood and deciduous forests, typically dominated by Bigleaf Maple (*Acer macrophyllum*). Cameron (1986) found this species at sites with moist, mull litter. One was a disturbed site with cottonwoods (*Populus* spp.) and willows (*Salix* spp.). The other was a mature (>100 yr old) stand of Western Redcedar (*Thuja plicata*) and Bigleaf Maple. Similarly, Ovaska et al. (2001a, b) found the species in deciduous and mixed-wood stands dominated by Bigleaf Maple, Western Redcedar, and Black Cottonwood (*Populus balsamifera*). A dense herbaceous cover was present at all sites, and Stinging Nettle (*Urtica dioica*) was often present. In addition to providing food, the presence of nettles may discourage trampling at sites having high recreational usage, but may also suggest moist surroundings.

Allogona townsendiana probably requires coarse woody debris, copious amounts of leaf litter, and both living and senescent vegetation. Shade provided by the forest canopy conserves moisture and ameliorates fluctuations in temperature and moisture conditions on the forest floor. Aestivating and hibernating snails require shelter, but the exact habitat attributes required for these functions are unknown. In Washington, *A. townsendiana* is known from seaside locations where a portion of the population occurs under logs just above the highest tides in association with the Pacific Sideband Snail (*Monadenia fidelis*) and other land snails (R. Forsyth, unpublished).

Allogona townsendiana occurs at low elevations. In Washington Its elevational range is below 85 m (Branson 1977). In British Columbia, elevations range from approximately 7–360 m; all but one locality are under 250 m; the exception is the Silver Creek locality (south of Hope; Appendix 1) that is ca. 365 m above sea level.

During surveys in 2000 and 2001, Ovaska et al. (2001a, b) located only adult snails. Spring-time surveys revealed that snails were exposed and active, and some individuals were partially buried in soft soil, ovipositing. Late spring may be an optimal time for visually locating adults, but the inability to find juveniles suggests that they are more secretive or may occupy different microhabitats, such as spaces within forest floor litter.

Trends

Areas adjacent to or surrounding the known localities of *A. townsendiana* in southwestern British Columbia have been modified extensively within the past century. Sumas Prairie, a flat, low-lying floodplain between Sumas and Vedder Mountains in the lower Fraser Valley, encompasses a large portion of the Canadian range of the species. The basin is characterized by layers of thick sediments, and the fertile soils provide rich habitats for diverse terrestrial and aquatic wildlife. A large lake (Sumas Lake) existed in the area prior to the early 1920s, when it was drained to reclaim land for agricultural

purposes and to control flooding. The lake covered about 10,000 acres [4046 hectares] and swelled up to about three times this size after spring floods (Sleigh 1999).

Presently the area is extensively farmed. In addition, urbanization of the lower Fraser Valley has proceeded rapidly within the past decade and is likely to continue expanding as the area is within a commuting distance from the city of Vancouver. The human population within both the Abbotsford and Chilliwack Census Agglomerations grew by 20% within a 5-year period from 1991 to 1995 (Statistics Canada 2001). Forested hillsides adjacent to and within the Fraser Valley seem to provide refuges for *A townsendiana*. However, hillsides are under pressure for housing developments; the surrounding, low-lying areas are within the Agricultural Land Reserve, which protects the conversion of farmland to other purposes. Today, habitat suitable for *A. townsendiana* is fragmented by agricultural lands, urban development, and natural topography (river, flats, mountains). In the Fraser Valley suitable habitat exists only on isolated hillsides and peripherally on the valley slopes.

Protection/ownership

Most low-elevation lands in the Fraser and Chilliwack Valleys are privately owned. There are two provincial parks in this area—Bridal Veil Falls and Cultus Lake—within the range of the *A. townsendiana*, and the species is known to occur at one of them. Within the whole of Fraser Valley less than 7% of the land is protected (Ministry of Lands, Environment and Parks 2000). Land use in the immediate area of the single, historical Vancouver Island locality is also agricultural; however, a small area of old-growth and second-growth forest is protected in nearby Eves Provincial Park.

Adjacent to most known localities of *A. townsendiana*, agricultural land is protected from land conversions by its designation within the Agricultural Land Reserve (ALR). The Canadian population of *A. townsendiana* may be negatively impacted by occurring on lands surrounded but not part of the ALR, which are therefore under pressure for urban development. Immediately adjacent areas in Washington, United States, are more rural and have not encountered the same rate of growth and development as seen in Canada.

BIOLOGY

General

The ecology and life history of *A. townsendiana* are poorly known. The species is hermaphroditic and oviparous. Eggs are laid in soil at shallow depths. Individuals may be slow-maturing and long-lived. The dispersal ability of the species is probably poor, based on its scattered distribution pattern, although some dispersal movements may occur during the reproductive period in spring when the animals appear to wander. Fragmentation of habitats by human activities and developments can be expected to pose barriers to movements.

Reproduction

Allogona townsendiana is a simultaneous hermaphrodite and lays eggs (Pilsbry 1940). Oviposition occurs in spring (Ovaska et al. 2001a, b) but may not be restricted to this season. The snails are most active during spring (Kozloff 1976), which is apparently correlated with mating and oviposition. These snails dig a depression into soft, moist soil and lay multiple eggs (Ovaska et al. 2001a). Clutch size is unknown, and nothing further is known about breeding requirements. Characteristics of the soil and litter layer may be important for oviposition sites.

Survival

During spring "roaming" behaviour *A. townsendiana* are likely to be at increased risk from predators that visually detect their prey. Additionally, snails may be trampled on pathways and roadsides. Juveniles have rarely been found, and no information exists on their survival rates. During 2000–2001, Ovaska et al. (2001a, b) failed to locate any juveniles, although adults were frequently encountered. Immature snails may not be as active as adults, and they may be more secretive.

Like other large land snails, *A. townsendiana* likely is long-lived. Most larger land snail species appear to be relatively slow-maturing, some reaching sexual maturity at the age of 5 years or even later (e.g., Pacific Sideband, *Monadenia fidelis beryllica*, in captivity; Roth and Pressley 1986).

A wide variety of mammals, birds, amphibians, reptiles and invertebrates prey on land snails. Predation may constitute a significant source of mortality of *A. townsendiana*, especially in small, poor-quality, degraded habitat patches. Carnivorous snails on southern Vancouver Island and the lower mainland British Columbia include several widespread and abundant native forest species (*Haplotrema vancouverense*, *Ancotrema sportella* and *A. hybridum*). Numerous exotic species may also pose a problem for native land snails through predation or competition for resources (Cameron 1986; Forsyth 1999b, 2001).

Movements/dispersal

Allogona townsendiana is relatively sedentary and appears to have poor dispersal abilities, as evidenced by its scattered distribution in northwest Washington State and in British Columbia. The snails are most active during the breeding period in spring, but the extent of these "roaming" movements is unknown. Active dispersal outward from centres of concentration would require both time and suitable habitat corridors. Beyond this, passive dispersal through chance events (transport by floods, mammals and birds, etc.) would be important, but likely rare. Fragmentation of habitats by human activities and developments can be expected to pose barriers, and the extent of genetic exchange among demes is unknown but probably very small.

Nutrition and interspecific interactions

The diet of *A. townsendiana* is unknown, but the species is likely to be a fungi-herbivore as are most other polygyrids and the majority of land molluscs. In captivity, the species readily consumes fresh vegetable matter (K. Ovaska, pers. obs.). The availability of food as a limiting factor for the survival of Canadian populations is unlikely, although the species' occurrence appears to be positively correlated with dense herbaceous vegetation; cover provided by low vegetation may be more important. Certain exotic slugs (such as *Arion rufus* and *Deroceras reticulatum*) reach very high densities in localized areas and may potentially compete with *A. townsendiana* for food and other resources.

Behaviour/adaptability

Allogona townsendiana is an inhabitant of older, mixed-wood, lowland forests and requires attributes of these forests for survival. This species tolerates some degree of disturbance from human activities, as evidenced by the persistence of the species in the Chilliwack Valley within a small habitat patch (<0.001 km^2), which is heavily impacted by human recreational use. Additionally, the species has been found in forest edge habitats (Ovaska et al. 2001a, b). However, the extent to which the snails can use edge habitats is unknown. Isolated habitat patches from where snails become extirpated are unlikely to be repopulated through immigration.

To our knowledge, *A. townsendiana* has not been bred in captivity. However, like many other terrestrial gastropods, the species can probably be reared in captivity with relative ease.

POPULATION SIZES AND TRENDS

Increased search effort since the 1950s has resulted in the finding of many additional localities not published in Pilsbry (1940) and earlier literature, but lack of density information precludes the assessment of population sizes and trends. Because there are few historical records, and no indication about the abundance of the species at earlier times, it is not possible to give evidence of range extensions or contractions. Furthermore, the exact localities of most early records are unknown.

Of the 38 sites searched by Ovaska et al. (2001a, b), 18.05 person-hours were spent searching at the 12 sites where *A. townsendiana* was found. Thirty-six live animals and 9 dead shells were found. This total, however, does not reflect densities, because at many sites the search was halted after the first individual was found (i.e., when the presence of the species was confirmed). In May 2000 when most of the observations occurred, the first individual of *A. townsendiana* was found after a mean search time of only 8 minutes. During six longer (32–142 person-minute) searches in April–June 2000 and 2001, Ovaska et al. (2001a, b) found an average of 4.0 snails per person-hour. The snails were active on the surface and relatively easy to locate during

spring. In contrast, during one survey in September, only one live animal was found during a 3 person-hour search; it was buried within leaf litter.

We are not aware of any extirpations at individual localities. However, only three localities have been revisited after several years, all of which continued to be occupied by *A townsendiana* (Ovaska et al. 2001a). One of these sites is presently only about 25 m x 25 m in area, but its extent during a previous visit approximately 10 years previously is unknown. The actual densities of snails at a given locality are unknown and would require an intensive mark-recapture study. At any one time, most individuals are probably hidden from view, and juveniles are least likely to be detected.

The geographic distribution of *A. townsendiana* straddles the Canada–United States boundary. In the United States, this species is not considered at risk, although its distribution is distinctly patchy in northwestern Washington (Burke, pers. comm. 2001). Natural exchange of individuals between Canadian and United States populations is exceedingly unlikely over long distance, but immigrants would possibly survive in Canada. Suitable habitat within the present range of the species in Canada is degrading and being fragmented; however, seemingly suitable habitat elsewhere (i.e., elsewhere in the Fraser Valley–Greater Vancouver area and much of southern Vancouver Island) appear not to be used by this species.

It is possible that in Canada *A. townsendiana* has always had a very patchy distribution because its population here lies at the northern fringe of its geographic range. The population is composed of demes that are apparently isolated by human-induced and natural obstacles.

LIMITING FACTORS AND THREATS

Probably most important to the survival of *A. townsendiana* in Canada is: 1) that the species has a limited, patchy distribution; and 2) that it lives in and adjacent to some of the most heavily modified and utilized land in British Columbia. Agricultural uses, logging, and most recently urbanization pose threats to the populations. Subpopulations of snails are becoming more isolated than historically, as habitat is lost and fragmented. In addition to isolating demes, habitat fragmentation can be expected to further degrade microhabitats, thus rendering the snails more vulnerable to natural predators and climatic fluctuations.

Although this species appears to persist in small concentrations in forest patches next to areas with heavy human use and some habitat disturbance, the minimum size of habitats that can support a viable population is unknown. The smallest occupied habitat patch that we know of is about 25 m x 25 m, but the occupied areas at most localities are unknown. Brush burning, mowing, logging, trampling, and pesticide use are expected to be adverse to the survival *A. townsendiana.*

Native snails may also be adversely affected by competition with introduced gastropods, which are prevalent in urban areas. Introduced species, the results of agricultural and residential development, are expanding their ranges and some have penetrated forested areas (Forsyth 1999b, 2001). In Canada, *A. townsendiana* occurs at the northern limit of the species' range, and as such may be particularly vulnerable to climatic fluctuations and other stochastic events.

SPECIAL SIGNIFICANCE OF THE SPECIES

Allogona townsendiana is restricted to the coastal lowlands between British Columbia and western Oregon but is not endemic to Canada; however, populations at the northern limits of their geographical range may possess unique adaptations and may be of scientific and conservation interest (Scudder 1989). Furthermore, we do not know the degree of genetic differentiation of Canadian populations with respect to those in the United States. Relatively few native large land snails inhabit west coast forests in British Columbia, and the presence of *A. townsendiana* is important to the biodiversity of the forest floor fauna.

No related species have special status, although in the western United States Frest & Johannes (1995) recommended that the Dryland Forestsnail (*Allogona ptychophora solida* [Vanatta, 1924]) and the Selway Forestsnail (*A. lombardii* A.G. Smith, 1943) be considered sensitive species.

The species appears to have little or no public interest and may be unknown to the general public. As far as it is known, *A. townsendiana* has no commercial value, and there is no evidence of aboriginal use (N. Turner, pers. comm.). It is possible that *A. townsendiana* could be mistaken for exotic pest snail species by residents, if it occurs at or near residential areas.

EXISTING PROTECTION OR OTHER STATUS

The British Columbia Wildlife Act, which prohibits the collection, handling, and trade of all native wildlife species without a permit does not apply to invertebrates at present, and native terrestrial gastropods in the province have no legal protection.

Globally, the species is presumed secure. It is not listed in the IUCN Red List (IUCN 2000) nor under the U.S. Endangered Species Act (US Fish and Wildlife Service 2001). It is also not listed under the Northwest Forest Plan (Kelley *et al.* 1999). Assessments for terrestrial gastropods have yet to be conducted for the British Columbia red and blue lists (S. Canning, pers. comm.).

Only one of the known Canadian localities of *A. townsendiana* is within a protected area, a provincial park having an area of 32 ha (Bridal Veils Provincial Park). The locality receives heavy recreational use.

SUMMARY OF STATUS REPORT

Allogona townsendiana has a restricted Canadian distribution in southwestern British Columbia. The species is of concern because its range coincides with the most densely populated part of the province and because occupied habitats are relatively small and isolated. Forested hillsides dispersed within agricultural lands and housing developments may provide refuges for the snails, but these are threatened by expanding urban development. The species can tolerate some degree of disturbance, as evidenced by its presence in forest edge habitats, but the extent of this tolerance and critical habitat requirements are unknown.

TECHNICAL SUMMARY

***Allogona townsendiana* (I. Lea, 1838)**
Oregon Forestsnail [l'escargot-forestier de Townsend
Southwestern British Columbia

Extent and Area information	
• *extent of occurrence (EO)(km²)*	ca. 1205
• *specify trend (decline, stable, increasing, unknown)*	?
• *are there extreme fluctuations in EO (> 1 order of magnitude)?*	?
• *area of occupancy (AO) (km²)*	< 20
• *specify trend (decline, stable, increasing, unknown)*	decline
• *are there extreme fluctuations in AO (> 1 order magnitude)?*	?
• *number of extant locations*	~19
• *specify trend in # locations (decline, stable, increasing, unknown)*	?
• *are there extreme fluctuations in # locations (>1 order of magnitude)?*	?
• *habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat*	decline
Population information	
• *generation time (average age of parents in the population) (indicate years, months, days, etc.)*	>1 yr
• *number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)*	?
• *total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals*	?
• *if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)*	
• *are there extreme fluctuations in number of mature individuals (> 1 order of magnitude)?*	?
• *is the total population severely fragmented (most individuals found within small and relatively isolated (geographically or otherwise) populations between which there is little exchange, i.e., ≤ 1 successful migrant / year)?*	Yes
• *list each population and the number of mature individuals in each*	Vancouver Island (number? No records since 1903); Fraser-Chilliwack Valley (number?)
• *specify trend in number of populations (decline, stable, increasing, unknown)*	?
• *are there extreme fluctuations in number of populations (>1 order of magnitude)?*	?
Threats (actual or imminent threats to populations or habitats)	
- Habit loss, degradation, and fragmentation mainly due to urban development	
Rescue Effect (immigration from an outside source)	
• *does species exist elsewhere (in Canada or outside)?*	Yes (Washington, Oregon, USA)
• *status of the outside population(s)?*	No special status
• *is immigration known or possible?*	Unlikely
• *would immigrants be adapted to survive here?*	Yes
• *is there sufficient habitat for immigrants here?*	Yes
Quantitative Analysis	

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BIOGRAPHICAL SUMMARIES OF CONTRACTORS

Robert Forsyth, is a dedicated amateur malacologist who since 1990 has travelled extensively throughout BC studying terrestrial molluscs. He is the author of 10 refereed papers on British Columbia terrestrial molluscs and is currently completing an identification guide to the land snails and slugs of British Columbia. Mr. Forsyth is a research associate with the Royal British Columbia Museum and is active in fieldwork, identification and research. With Dr. Ovaska, he is also investigating the distribution of terrestrial gastropods deemed to be at risk in southwestern British Columbia (2000–2001; funded, in part, by the Endangered Species Recovery Fund and Wildlife Habitat Canada). Mr. Forsyth is a member of COSEWIC's Mollusca Species Specialist Group.

Kristiina Ovaska, Ph.D., M.Sc., received her doctoral degree (biology) from the University of Victoria in 1987, after which she completed two post-doctoral studies in population biology and ecology of amphibians. Currently, she is senior ecologist with Biolinx Environmental Research Ltd. (Sidney, British Columbia) and research associate at the Department of Forest Sciences, University of British Columbia. Over the past 15 years, Dr. Ovaska has prepared several environmental impact assessments and status reports and conducted research on a variety of wildlife (vertebrates and invertebrates), including endangered species. She is the author of more than 30 publications in refereed scientific literature. Dr. Ovaska is a principal investigator of an ongoing project addressing the use terrestrial gastropods as indicators of forest-floor conditions in relation to different logging practices (project conducted for Weyerhaeuser Company Limited). She is also a principal investigator of a study dealing with the distribution of terrestrial gastropods deemed to be at risk in southwestern British Columbia (funded, in part, by the Endangered Species Recovery Fund and Wildlife Habitat Canada).

AUTHORITIES CONSULTED

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COLLECTIONS EXAMINED

The following institutional collections were consulted and held Canadian records of *Allogona townsendiana* (RBCM and CMN collections were personally examined by R. Forsyth):

Canadian Museum of Nature [CMN], PO Box 3443, Stn. D, Ottawa, ON, Canada K1P 6P4

The Field Museum of Natural History [FMNH], 1400 S. Lake Shore Drive, Chicago, IL, USA 60605-2496

Royal British Columbia Museum [RBCM], 675 Belleville Street, Victoria, BC, Canada V8V 1X4

The following institutions reported that they have no holdings of *A. townsendiana:*

Delaware Museum of Natural History [DMNH], 4840 Kennett Pike, PO Box 3937, Wilmington, DE, USA 19807-0937

The Philadelphia Academy of Natural Sciences [ANSP], 1900 Benjamin Franklin Parkway, Philadelphia, PA, USA 19103

Royal Ontario Museum [ROM], 100 Queen's Park, Toronto, Ottawa, ON, Canada M5S 2G6

Smithsonian Institution [USNM], Washington, DC, USA 20560-0163